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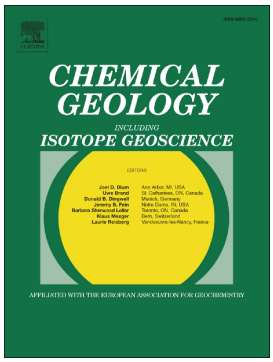

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Alkali-carbonate melts from the base of cratonic lithospheric mantle: links to kimberlites

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Highlights:

We studied melt inclusions in olivine of sheared peridotite xenoliths from kimberlites

These xenoliths are derived from 180–230 km and are among the deepest mantle rocks

Alkali-rich carbonates, halides, sulphates and aragonite were found in melt inclusions

Melt inclusions are snapshots Cl–S–alkali-rich carbonate melt originated at > 230 km

The high-pressure melt inclusions may represent near primary kimberlite melt

Abstract

Identification of the primary compositions of mantle-derived melts is crucial for understanding mantle compositions and physical conditions of mantle melting. However, these melts rarely reach the Earth's surface unmodified because of contamination, crystal fractionation and degassing, processes that occur almost ubiquitously after melt generation. Here we report snapshots of the melts preserved in sheared peridotite xenoliths from the